GROUNDWATER 101

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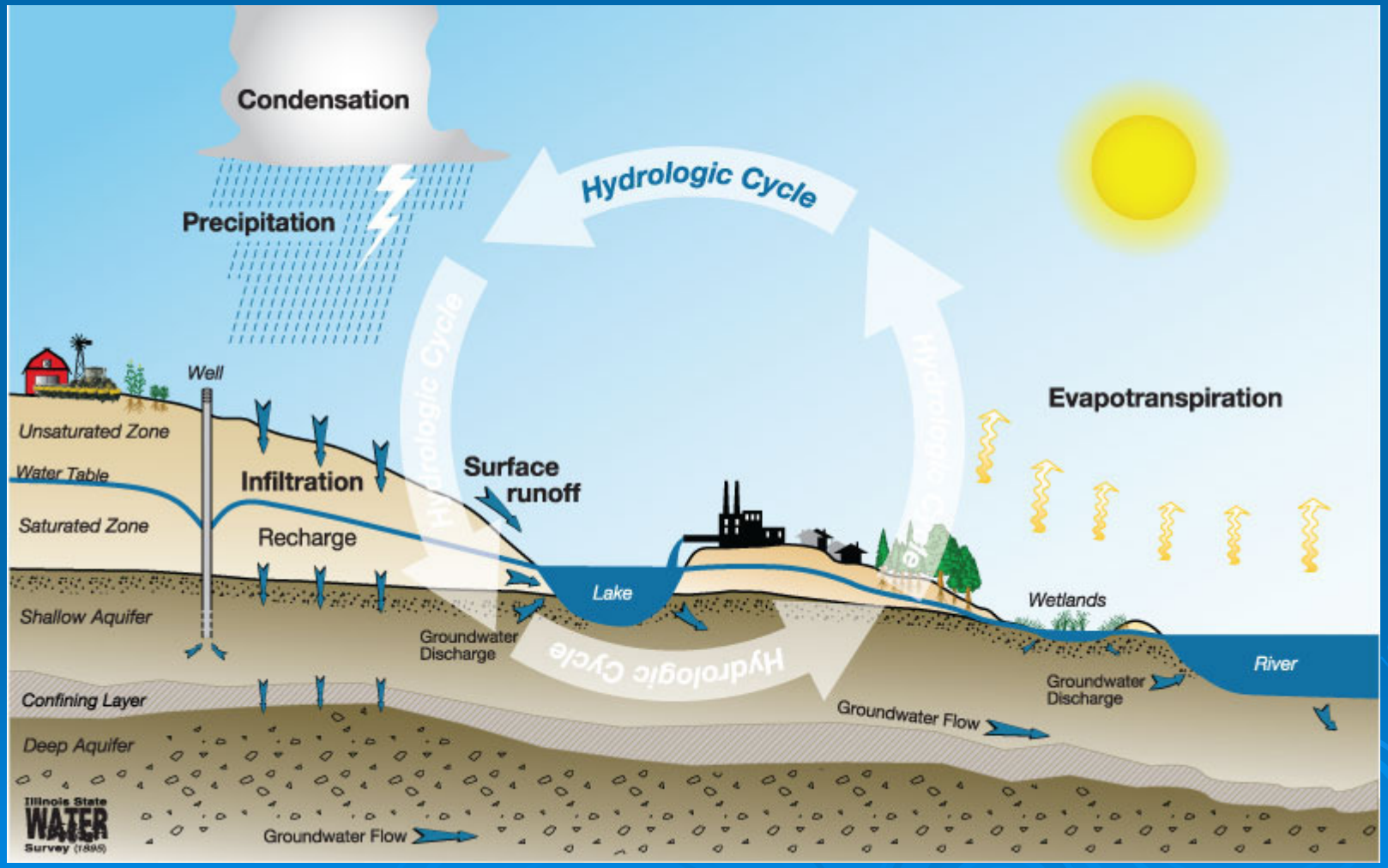
PRESENTATION OVERVIEW

- Important Points
- Hydrologic Cycle
- Groundwater Flow
- Central Valley Groundwater

IMPORTANT POINTS

- Groundwater Important in Hydrologic Cycle
- Groundwater and Surface Water are Connected
- Groundwater Development has Altered Groundwater Flow and Quality

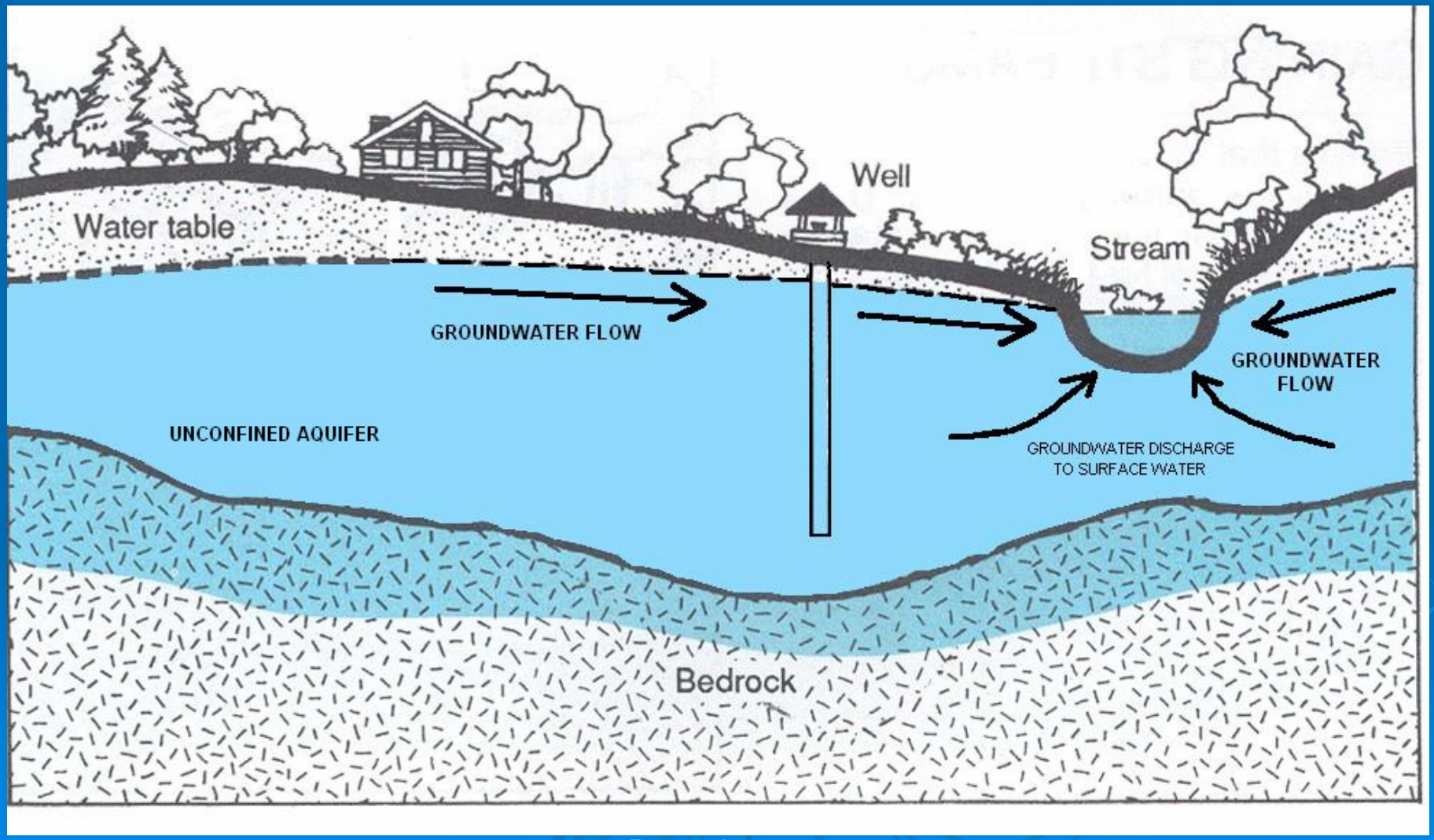
HYDROLOGIC CYCLE



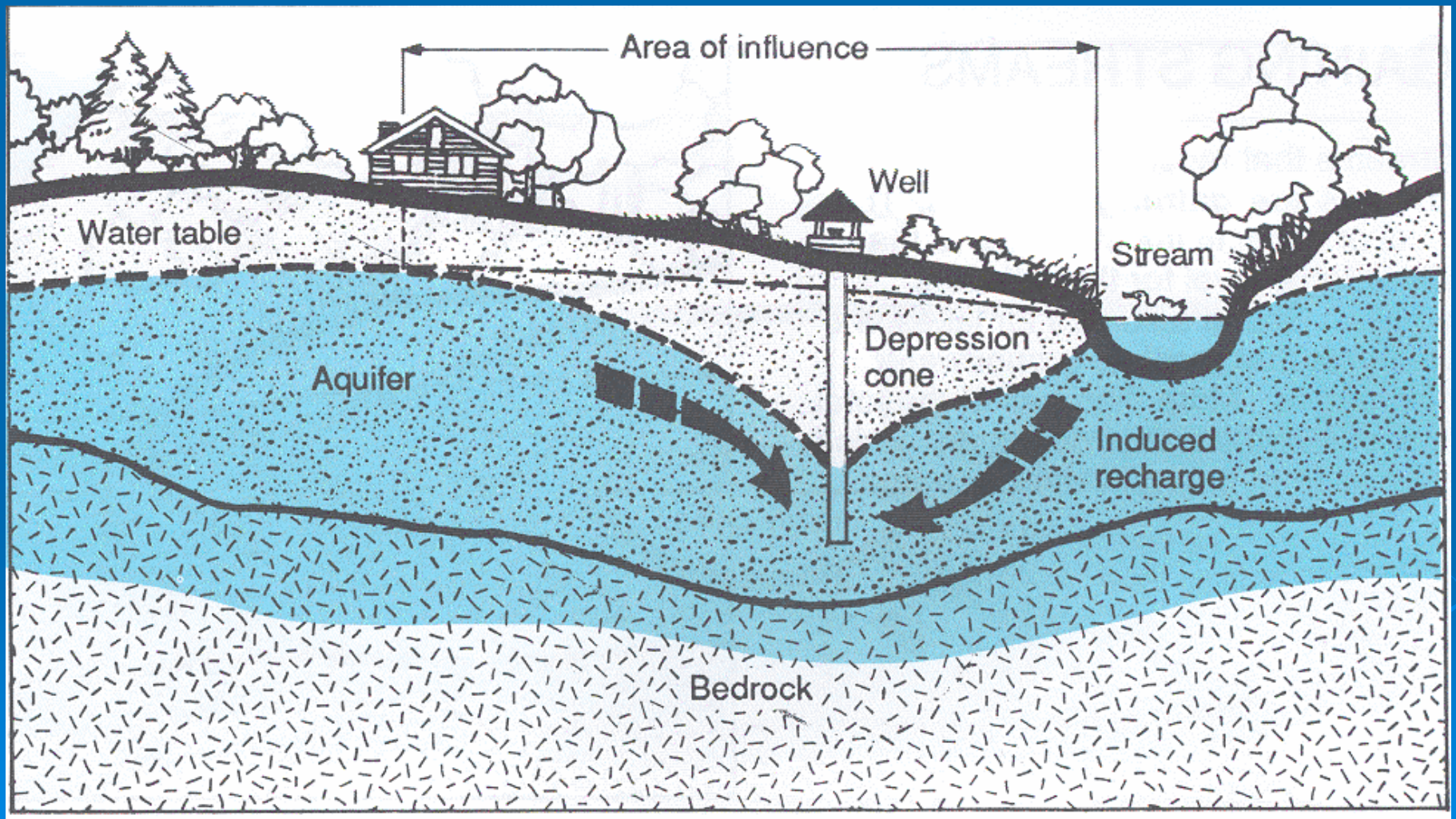
GROUNDWATER FLOW

- FLOW RATE – very slow
  Less than 1 foot/day to tens of feet/day
- FLOW DIRECTION – toward decreasing head
- RATE AND DIRECTION - influenced by pumping

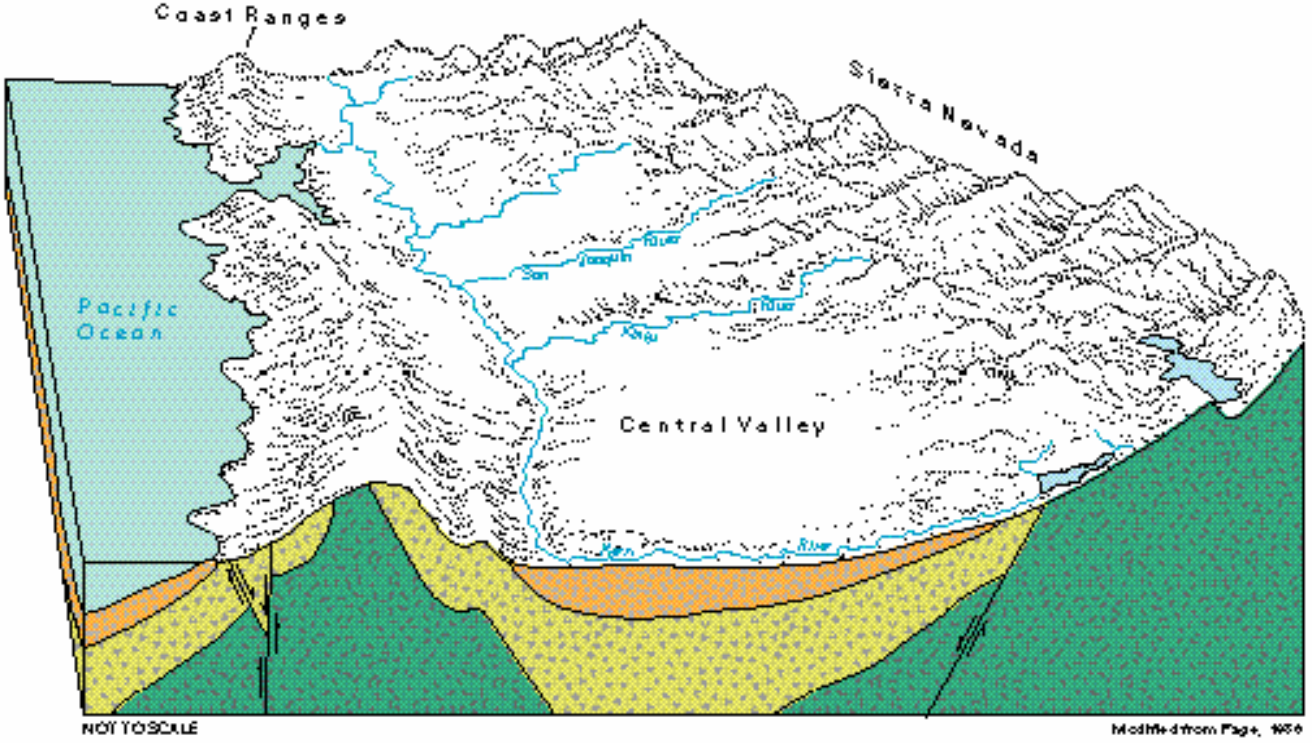
GROUNDWATER FLOW



GROUNDWATER FLOW

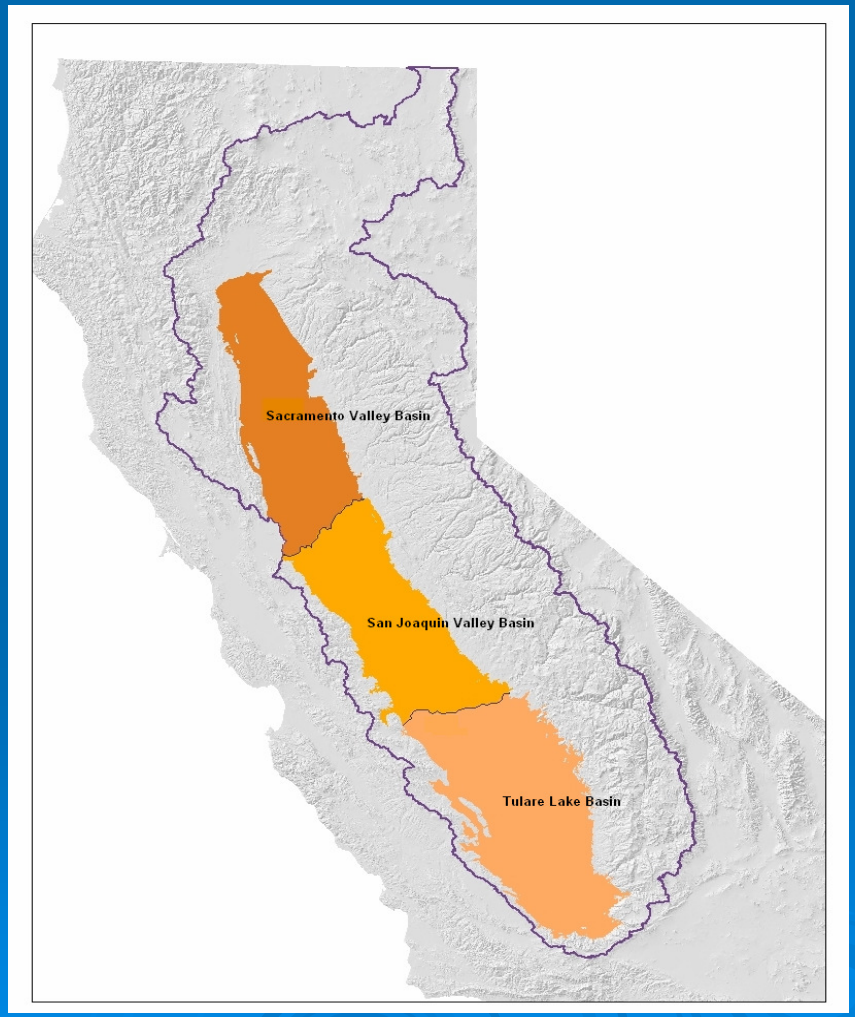


CENTRAL VALLEY GEOLOGY

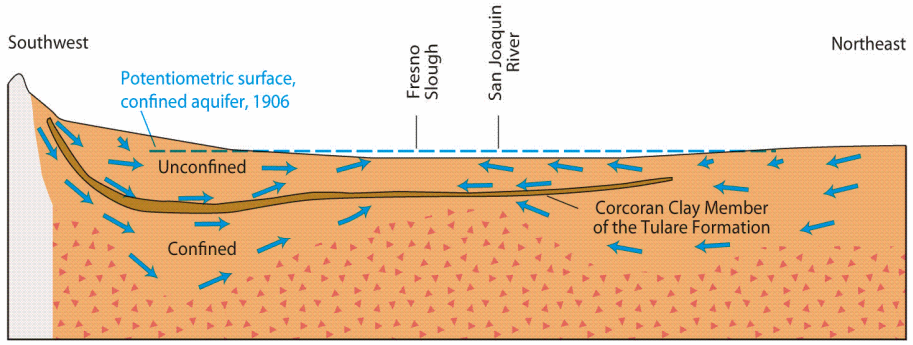


Page, R.W., 1986, Geology of the fresh ground-water basin of the Central Valley, California, with texture maps and sections: U.S. Geological Survey Professional Paper 1401–C, 54 p.

MAJOR AQUIFER SYSTEMS



PRE-DEVELOPMENT GROUNDWATER



NOT TO SCALE

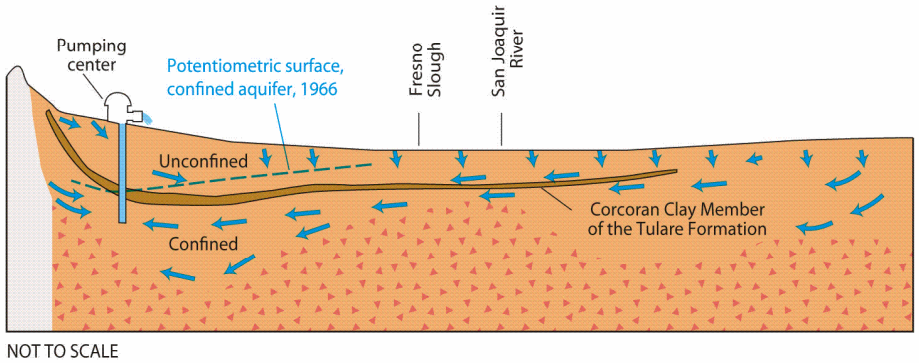
Bertoldi, G.L., Johnston, R.H., and Evenson, K.D., 1991, Ground water in the Central Valley, California—A summary report: U.S. Geological Survey Professional Paper 1401–A, 44 p.

Central Valley aquifer system

Saltwater

Direction of ground-water movement

POST-DEVELOPMENT GROUNDWATER



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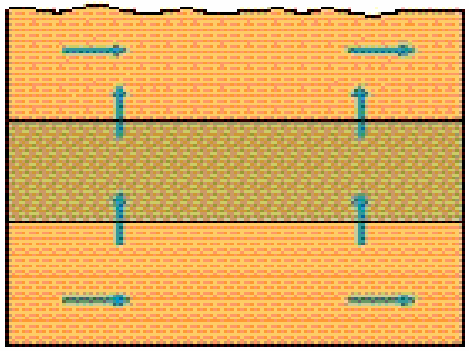
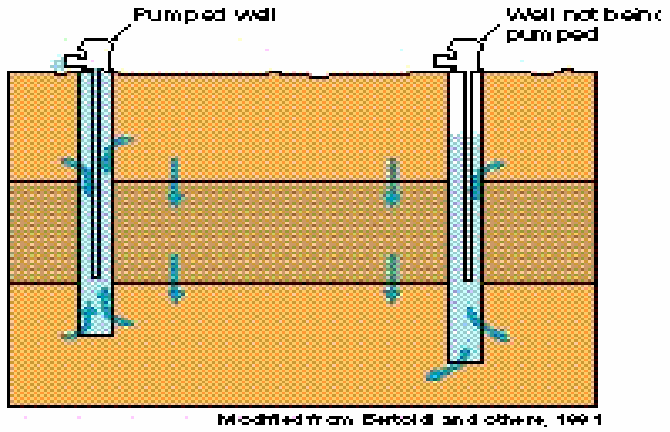
PRE- AND POST-DEVELOPMENT GROUNDWATER





Bertoldi, G.L., Johnston, R.H., and Evenson, K.D., 1991, Ground water in the Central Valley, California—A summary report U.S. Geological Survey Professional Paper 1401–A, 44 p.

EFFECTS OF GROUNDWATER DEVELOPMENT

- Flow Directions Changed
- Groundwater Levels Declined
- Land Subsidence Occurred
- Recharge and Discharge Changed
- Groundwater Quality Changed

CENTRAL VALLEY GROUNDWATER QUALITY

- Salinity, Nitrates, Pesticides
  - Introduced into the Shallow Groundwater
  - Moving Downward to Deeper Groundwater

CENTRAL VALLEY GROUNDWATER QUALITY

SALINITY

- All Water Contains Salt
  - Evaporation and consumptive use concentrates salts
- San Joaquin Valley
  - Over 400,000 tons salt/year added to confined aquifer
- Westside San Joaquin Valley –
  - 113,000 acres retired due to high salinity, shallow groundwater
- Tulare Lake Basin
  - Most imported salt (one million tons/year) migrates to groundwater

CENTRAL VALLEY GROUNDWATER QUALITY

NITRATE

- Occurs throughout Central Valley
- 10-15% of California Supply Wells Exceed Drinking Water Standard
- Most Common Pollutant to Shutdown Supply Wells

CENTRAL VALLEY GROUNDWATER QUALITY

PESTICIDES

- Occur throughout Central Valley
- Department of Pesticide Regulation Groundwater Protection Program

SUMMARY

- Groundwater Important in Hydrologic Cycle
- Groundwater and Surface Water are Connected
- Groundwater Development has Altered Groundwater Flow and Quality

Questions?


STATE OF CALIFORNIA
CENTRAL
VALLEY
REGION
REGIONAL WATER QUALITY CONTROL BOARD